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PERSEREC

**ISSUES DEVELOPED IN BACKGROUND
INVESTIGATIONS CONDUCTED BY
DEFENSE INVESTIGATIVE SERVICE**

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Preface

It has long been recognized that analyses of the issues contained in Defense Investigative Service (DIS) background investigations has needed better information than that provided by the Defense Central Index of Investigation (DCII). Simply knowing that an issue is present in a case provides no information about the type of issue, the presence of multiple issues, or the prevalence of certain combinations of issues. Since the beginning of PERSEREC we have made inroads into this information gap by developing a data base of the issues found by DIS background investigation. The following report is the first report which makes use of the data source.

This report focuses on the issues found in the Background Investigation (BI) and the Special Background Investigation (SBI). Comparing these investigations is a high priority research topic because BI is considered an effective and expedient alternative to the SBI. Based on the analysis, there appears to be very little difference between the two procedures.

Aside from the research questions, security professionals should find interesting the types of issues contained in DIS investigations. The graphs in this report show clearly and concisely the single and multiple issues that appear most often in the backgrounds of defense employees. It is useful information.

Roger P. Denk
Director

Issues Developed in Background Investigations Conducted by the Defense Investigative Service

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Summary

Background and Problem

The type and frequency of derogatory information contained in Defense Investigative Service (DIS) background investigations has not been well documented. It has been possible to determine that at least one issue was present but the type of issue and the presence of multiple issues has been hard to determine. In cooperation with the Personnel Investigation Center (PIC), a data base has been developed that contains information about the issues uncovered during background investigations. This data have been used in the present report to examine the issues obtained in two types of background investigations conducted by DIS: the Background Investigation (BI) and the Special Background Investigation (SBI).

Approach

Using data supplied by PIC, an analysis was performed on the issues contained in 881 BIs and 812 SBIs conducted by DIS.

Two types of analyses were performed. Where data allowed, statistical tests of contingency tables were conducted. In instances where data were not amenable to statistical manipulation, graphical analysis was performed on the patterns of issue combinations generated by the two investigative methods.

Results

Demographics

The analyses show that the SBI population has proportionally more women and more DoD civilians than the BI population. There are no age differences between the two groupings.

Investigations

Number of Issues per Investigation. Analysis of the number of issues per investigation shows no difference in the frequency of issues generated by the BI and SBI. There are more issues per investigation for the BI population than the SBI, but no difference in the proportion of multiple issues.

Distribution of Issues. A graphical depiction of the distribution of issues in the BI and SBI populations shows there is only slight variation in the pattern of issues developed by the different investigations. In both the BI and SBI, the three most prevalent issues are the single-issue categories of finances, drugs, and mental-emotional. The next most common issues vary slightly between the BI and SBI but have similar patterns of single- and multiple-issue combinations: crime, drug-crime, alcohol, alcohol-drug, alcohol-drug-crime, and alcohol-crime. Overall, there is virtually no difference in the kinds of issues generated by the BI or the SBI.

Conclusions

The analyses indicate there is little difference between the BI and SBI in terms of the type and amount of information obtained. The quality of material generated by the procedures still needs to be evaluated.

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Introduction

Problem

The Defense Investigative Service (DIS) must conduct alternatively two different types of investigations to obtain background information: the Background Investigation (BI) and the Special Background Investigation (SBI). The different types of investigations are directed by separate regulations that govern eligibility for access to different types of classified information.

The BI is conducted for individuals requiring Top Secret clearance. The investigation covers the most recent five years of a subject's background and involves, as a matter of procedure, an indepth interview of the subject. The investigation also contains source interviews and records checks for the five-year period.

The SBI is conducted for individuals requiring access to programs which contain Sensitive Compartmented Information (SCI). The SBI investigates up to 15 years of a subject's background, depending upon the age of a subject, and uncovers issues through record checks and interviews with sources who are familiar with the candidate's background. Issues are generally resolved through a subject interview; otherwise, an indepth interview is not a matter of procedure.

This paper examines the BI and SBI in terms of the type of information that is developed by the two investigative methods. All security investigations have two possible outcomes: the investigation either yields no information that casts doubt about the subject, or it uncovers problems or questions about the subject's character. These issues are resolved by further investigation before a subject is granted clearance eligibility.

Both the BI and SBI return information about 11 issue categories: alcohol, drugs, finances, mental-emotional, crime, sexual, loyalty, foreign connections, foreign preference, falsification, and security violations. The focus of this inquiry is whether there is a difference in the types of issues that are developed by the BI and SBI.

Comparing the issues generated by the BI and SBI is not a straightforward matter, because differences in investigative method are confounded by differences between the populations that are nominated for TS and SCI clearances. There is already a considerable body of research about these population differences (e.g., Crawford and Wiskoff 1988, Flyer 1987, Laurence and Colot 1987). Briefly, in comparison to the BI the SBI population has proportionately more women, and candidates tend to be screened more carefully and to have higher educational levels. The net effect of these differences is that SBI candidates appear to have less derogatory information in their backgrounds; this shows up as a lower proportion of

issues for SBI candidates. The problem is that it is impossible to ascertain if the lower issue case rate results from characteristics of the population or characteristics of the investigation.

The present study takes a different approach to the questions surrounding the BI and SBI. It compares the types of issues contained in the issue cases of BI and SBI samples. The unit of analysis is the issue(s) generated by BIs and SBIs. Analyses are conducted to determine if there are differences in the composition (i.e., frequency and patterns) of the issues. The study does not eliminate the confounding factors discussed above, but it looks at the issue characteristics of the two populations as developed by the investigative method.

The presumption is that if wide differences are found between the issue patterns of the BI and SBI there is reason to suspect that there are profound differences between either the investigative method or the population characteristics. If differences are not evident, however, there is reason to think that once issues have been uncovered there is little difference in the ability of the BI and SBI to investigate issues.

This study represents an improvement over previous studies of the BI and SBI because it focuses on issues after the issue has been identified. As such, it provides a graphical depiction of issue characteristics of candidates for DoD security clearances. The analyses should prove interesting to a wide cross-section of the personnel security community.

The data analyzed for this study represent a sample of 812 SBI issue cases and a sample of 881 BI issue cases. Each record consists of demographic information about an individual (gender, age, and employment status) and entries indicate one or more of the 11 issue categories which caused the particular person to qualify as an issue case.

The data were obtained from the Quality Assurance Branch of DIS Personnel Investigations Center (PIC). This branch is responsible for ensuring that the quality of investigations represents a uniform, acceptable standard. This branch normally samples the issue cases processed each week through the PIC. They select an incidental sample of issue-case records and evaluate the files for adherence to investigation standards. The branch provided the demographic and issue data for each record processed through their office over a period of several months. There is no information about the total number of cases that were available for sampling, so population inferences are limited.

Disclaimer

The data show only the categories of issues for each record, and give no indication of the quality and depth of information produced by each procedure.

Assumptions

An assumption was made that the data represent two random samples of SBI and BI issue cases. The selection procedure followed by the Quality Assurance Branch is assumed to be unbiased with regard to selection of SBI or BI cases.

Exploratory Data Analysis

Comparisons of the Populations by Demographic Factors

Three demographic factors are recorded for each record in this study: gender, age, and employment status of the subject. Gender and age are self-explanatory. Employment status refers to one of three types of defense employment: Department of Defense (DOD) civilian employees, industrial civilian employees (individuals who work for defense contractors who require access to classified information in the conduct of the government contract-related activities of their employer), and members of the military services.

Each demographic category was summarized into its components and a two-way layout was constructed which allowed the configuration of both samples to be jointly compared for the particular category. For example, a table of counts of males and females for both the BI and SBI samples was constructed. The marginal counts were also constructed and yielded a contingency table layout. The samples could then be compared to determine whether differences in the proportions of various categories in each sample represented a statistically significant difference. This difference was investigated using contingency table analysis techniques, in particular the two-sample chi-square, goodness-of-fit technique (Gibbons, 1976), and residual analysis. Using this technique, each of the three demographic factors was compared between samples.

Graphs of the demographic data are presented as figures whenever possible to represent visually the results of the statistical tests.

Gender

The two populations were compared to see whether they differed by gender, i.e., whether the proportions of males to females are the same within the SBI and BI populations.

A contingency table which represents the counts and residuals (Anscombe 1981) of the gender classification for each of the samples was constructed (Table 1). The column marginal totals are the fixed numbers which represent the sizes of the samples from each investigation procedure.

TABLE 1
Contingency Table for Gender for BI & SBI:
Counts and Residuals

	<u>SBI</u>	<u>BI</u>	<u>Total</u>
Male	601 (-.9579)	702 (.9197)	1303
Female	211 (1.751)	179 (-1.681)	390
Total	812	881	1693

Summing the squared residuals produced a chi-square statistic T , with 1 degree of freedom:

$$T = 7.6552$$

This produced a P-value of less than .01, which indicates that there is a significant difference in the proportion of males to females in each population. There appear to be more males proportionally in the BI population than in the SBI population. Relative frequency histograms for each sample are displayed in Figure 1. There is a small statistically significant difference in the proportion of women between samples: there are proportionately more women in the SBI sample.

Age

Ages were coded into groupings (16-20 years old, 21-25 years old, etc.) and the samples were compared for age differences. The statistical test is that the age grouping proportions are the same for the SBI and BI populations; the alternative hypothesis is that the age grouping proportions differ for at least one grouping.

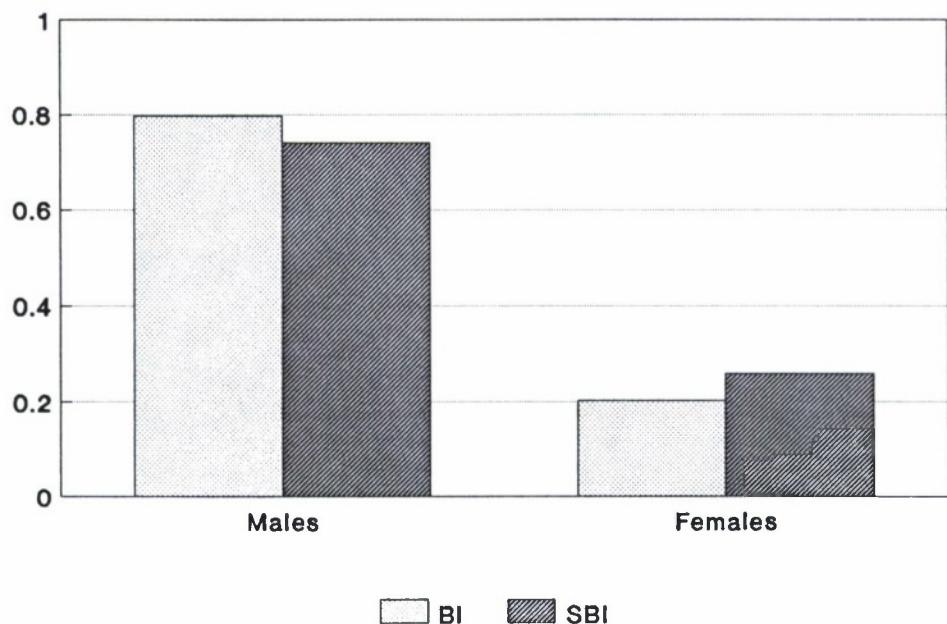


Figure 1. The Relative Frequency of Gender in the BI and SBI Sample.

A contingency table (Table 2), giving counts and residuals of age groups for each population, was constructed.

TABLE 2
Expected Values and Residuals for Age in BI and SBI Samples

Age Grouping Missing	SBI 3 (-1.951)	BI 4 (.1873)	Total 7
16-20	93 (.0544)	102 (.0522)	195
21-25	177 (-.7351)	213 (.7056)	390
26-30	199 (1.4273)	176 (-1.3703)	375
31-35	125 (-.6005)	150 (.5765)	275
36-40	96 (.3568)	97 (-.3426)	193
41-45	54 (-.0915)	60 (.0879)	114
46-50	27 (-.5851)	36 (.5617)	63
51-55	25 (.1768)	29 (.1697)	54
56-60	13 (.5927)	10 (-.5691)	23
61-75	0 (-1.3851)	4 (1.3298)	4
TOTAL	812	881	1693

Summing the squared residuals produced a chi-square statistic T with 10 degrees of freedom:

$$T = 11.0656$$

This resulted in a P-value larger than .25, which strongly suggests that the populations of SBI and BI issue-cases do not differ in their configuration by age. The results are graphically displayed in Figures 2 and 3; the general shape of the histograms appears almost the same for both samples.

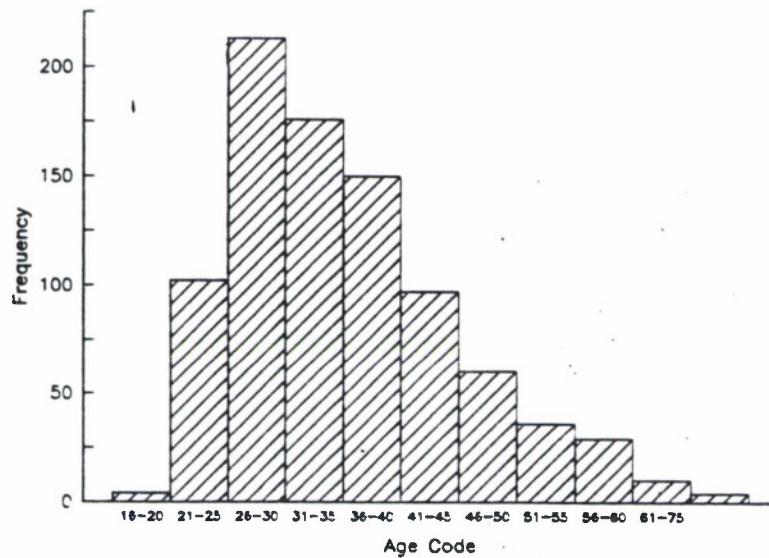


Figure 2. The Relative Frequency of Each Age Code in the BI Sample.

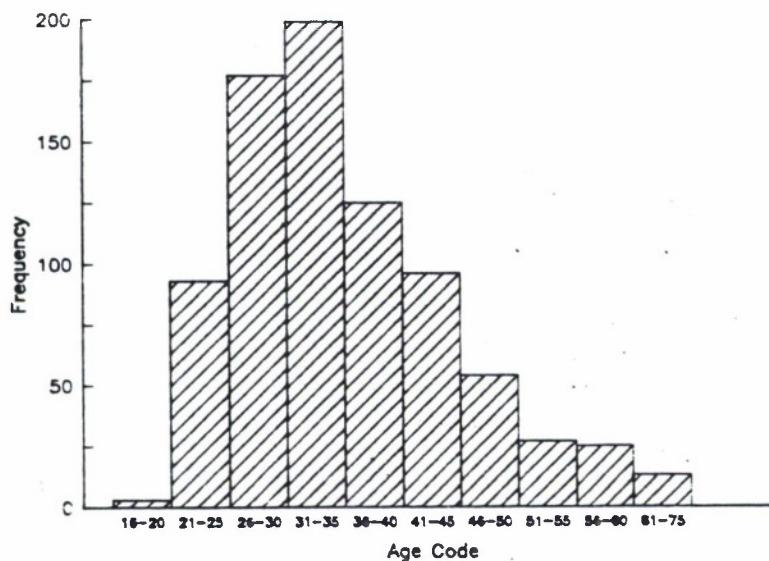


Figure 3. The Relative Frequency of Each Age Code in the SBI Sample.

Employment Status

The samples were compared to see if the populations differed by employment status. The hypothesis was that the employment status proportions within the SBI and BI populations are the same; the alternative was that the employment status proportions were different in at least one category.

The following contingency table of counts and residuals for employment status was constructed (Table 3).

TABLE 3

Expected Values and Residuals for Employment Status
for BI and SBI Samples

<u>Employment Status</u>	<u>SBI</u>	<u>BI</u>	<u>Total</u>
DOD Civilian	94 (2.6004)	56 (-2.4965)	150
Industrial Civilian	299 (-.7489)	352 (.7190)	651
Military	419 (-.4266)	473 (.4095)	892
Total	812	881	1693

Summing the squared residuals produces a chi-square statistic T with 2 degrees of freedom:

$$T = 14.422$$

This statistic has a P-value of approximately 0.0000, indicating that the populations differ in their configuration by employment status. In particular, the difference seems to center primarily in the proportion of DOD civilians, as shown by the large residuals in the categories in Table 3: DoD civilian 2.6004 and -2.4965 respectively. The number of DOD civilians in the SBI sample is significantly larger than the proportion of DOD civilians in the BI sample (11% versus 5%). This difference is easily seen in Figure 4.

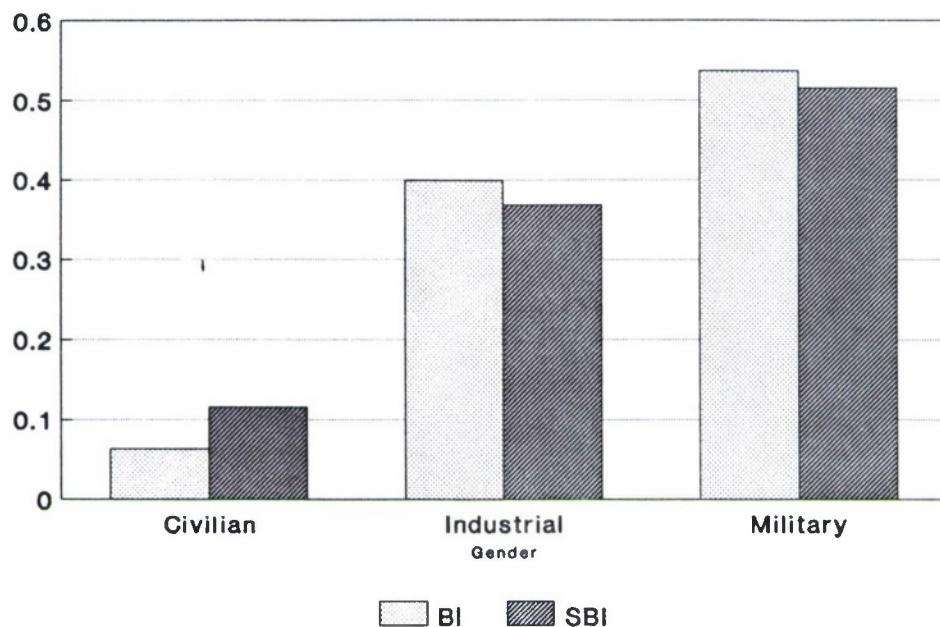


Figure 4. The Relative Frequency of Each Employment Status in the BI and SBI Sample.

Analysis of Issues

Most of the information in the file shows the issue category, or categories, for each individual. Every record also contains a word in each field indicating issues associated with the particular subject. All records had at least one issue; however, many records had multiple issues.

Number of Issues

The populations were compared to see whether they differed by the number of issues per record. Statistical hypotheses were constructed for a test of whether the proportions of issues per individual within the SBI and BI populations were the same, or the proportions of issues were different.

A contingency table was constructed for the counts and residuals of the number of issues for individuals in the BI and SBI samples. Records with more than five issues were sparse so the table was collapsed. The reformulated table is shown in Table 4.

TABLE 4
Expected Values and Residuals for Number of Issues in BI and SBI Samples

Number of Issues	1	2	3	4	5-7	Total
SBI	484 (-1.31)	200 (-.983)	86 (1.11)	30 (-.695)	12 (.4459)	812
BI	467 (-1.25)	247 (.9436)	116 (1.062)	41 (.668)	10 (-.428)	881
Total	951	447	202	71	22	1693

Summing the squared residuals produced a chi-square statistic T , with 4 degrees of freedom:

$$T = 8.7895$$

This produced a P-value of approximately .075, indicating that the proportion of issues per individual in each population, SBI and BI, is the same. The general shape of the histogram in Figure 5 supports this.

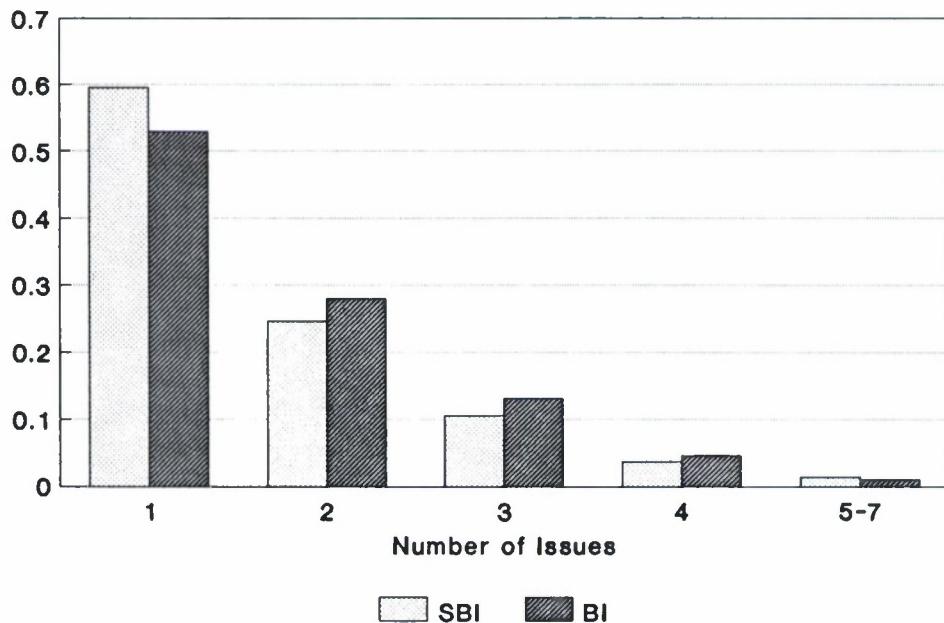


Figure 5. The Relative Frequency of the Number of Issues Per Individual in the BI and SBI Sample.

General Pattern of Issues

It is of interest to look at the distribution of issues for each population, but it is inappropriate to talk about the way issues are "distributed" because each issue category is not mutually exclusive. Table 5 shows the general distribution of individual issues without accounting for issue combinations.

As indicated in Table 5, the SBI has a lower average of issues per individual (1.63) than the BI (1.73). This difference has statistical significance ($t = 2.15, p <.05$), but little meaning should be attached to this difference. The more important statistical test is the proportion of issues per individual which was conducted on Table 4 and was not significant. The BI population may have more issues than the SBI but a conservative interpretation of this difference is advised.

TABLE 5
Frequency and Percent of Issues in BI and SBI Samples

<u>Issue</u>	<u>SBI</u>		<u>BI</u>	
	<u>Count</u>	<u>Percent</u>	<u>Count</u>	<u>Percent</u>
Alcohol	135	16.6	192	21.8
Drug	304	37.4	369	41.9
Finances	298	36.7	329	37.3
Mental	154	19	162	18.4
Crime	196	24.1	242	27.5
Sexual	69	8.5	58	6.6
Loyalty	6	.7	11	1.3
Connections	20	2.5	26	3
Foreign Pref.	9	1.1	5	.6
Falsification	123	15.2	120	13.6
Security Vio.	12	1.5	12	1.4
Total	1326		1526	
Sample Size	812		881	
Average	1.63		1.73	

Statistical analysis of the issues in Table 5 is not possible because the issues do not represent unique classifications. For example, an individual may have issues with both drugs and alcohol. This person would be double-counted and contingency table analysis would be inappropriate for this data.

A bar chart (Figure 6) was constructed from the counts in Table 5; it indicates the frequency of appearance of individual issues in each sample. Figure 6 shows there are nearly equivalent proportions of the issues in both the SBI and BI samples. The percentage of individuals in the SBI sample associated with any particular issue is generally less, but the shape of the bar chart is nearly identical for both.

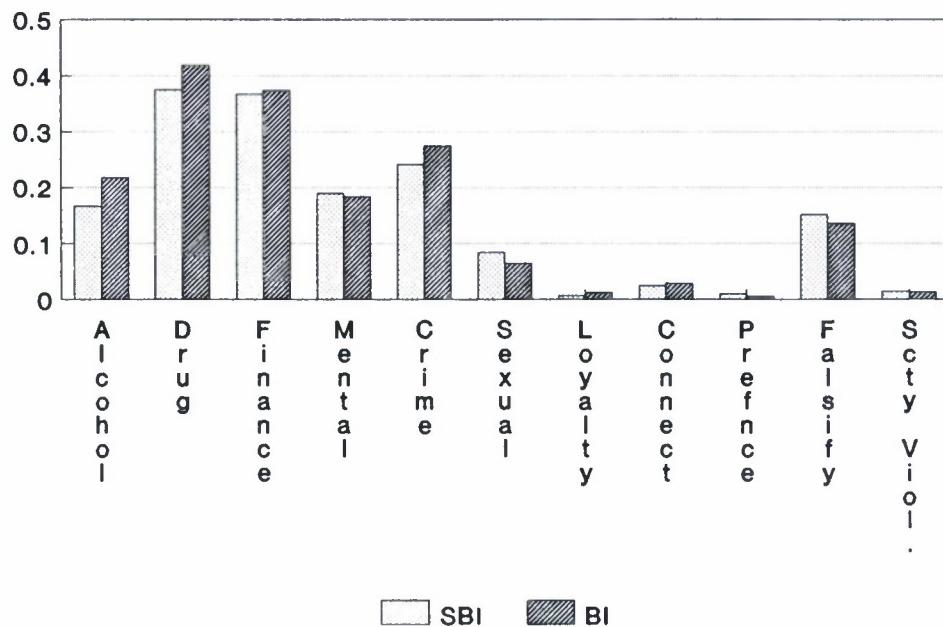


Figure 6. Relative Frequency of Issues by Type in Each Issue Category

Issue Combinations

Another way to look at the issue interaction is to construct a table of counts for all the unique combinations of issues. Out of a possible 2^{11} occurrences, 134 different combinations of issues were present in the two samples. Since this large number of combinations is too difficult to interpret, the 20 most common combinations, based upon the BI ranks, are listed in Table 6 below; BI ranking is used to allow comparison between the samples.

TABLE 6
Twenty Most Frequent Issue Combinations Based on BI Ranking,
in BI and SBI Samples

<u>Issue Combination</u>	<u>SBI Sample</u>		<u>BI Sample</u>	
	<u>Count</u>	<u>Rank</u>	<u>Count</u>	<u>Rank</u>
Finances	187	1	175	1
Drug	124	2	115	2
Mental	68	3	74	3
Crime	28	5	37	4
Drug-Crime	21	7	35	5
Drug-Finance	15	11	34	6
Alcohol	31	4	31	7
Alcohol-Drug	15	11	28	8
Alcohol-Drug-Crime	12	14	23	9
Alcohol-Crime	17	8	22	10
Drug-Falsify	16	10	19	11
Finance-Crime	13	13	17	12
Drug-Mental	22	6	15	13
Finance-Mental	8	18	11	14
Sexual	17	8	11	15
Drug-Finance-Crime	6	25	11	16
Alcohol-Finance	2	46	11	17
Drug-Crime-Falsify	9	16	9	18
Foreign Connections	10	15	9	19
Loyalty	4	31	9	20

While 134 combinations occurred, Table 6 indicates that the frequencies rapidly decreased after the first 20 combinations are displayed. The BI and SBI samples appear to display very similar rankings of issue types, with some differences apparent.

Table 6 does not allow for an easy comparison between issue combinations of the BI and SBI. However, when the numerical information is combined with a graph of the interaction of the various issues, we gain a much stronger insight into the most common interactions within each sample. This provides a quick way to compare interactions between and within samples; similarities are highlighted and differences are much more quickly apparent.

BI Issue Combinations

Figure 7 is a skyscraper plot of the BI information in Table 6. The x-axis (the axis labeled "Issue Combination") represents the 20 most frequent BI issue combinations. Perpendicular to the x-axis are the issue categories. The towers along this axis represent the prevalence of the particular issue category. The z-axis represents the count (or frequency) of any particular issue-combination.

As an example of the interpretation of Table 6, the tallest skyscraper in Figure 7 is to the left of the graph. The count indexed along the x-axis is 175. This means there is a frequency of occurrence of this combination of 175 within the BI sample. Reading back along the column from the x-axis, we see only one skyscraper. This is a single issue category. Following the y-location to the y-axis, we see that this skyscraper represents the finances issue category. To summarize, the most frequently occurring issue combination is a single issue, finance: 175 individuals have this problem.

Moving to the fifth issue along the x-axis, two skyscrapers line up in the y-direction. This represents a combination of drug and crime with a count of 35. This means that the fifth most common combination in the BI sample was the drug-crime combination; 35 people have this particular problem.

Only the first 20 combinations are listed because the graph gets increasingly difficult to read with more combinations; however, these first 20 combinations represent 696 out of the 881 total combinations, which means that 79% of all persons in the BI sample have one of these issue combinations.

What does this graph tell us? The first four most frequent issue combinations are finances alone, drugs alone, mental alone, and crime alone (in fact 45% of the BI cases are contained in these four single issues). We also see that not only are drugs alone and finance alone the most common combinations, but as we move to the right, we see that they frequently interact with other issue categories. In the same light, while alcohol is relatively infrequent as a single factor, the seventh through tenth most common combinations involve multiple issue combinations involving alcohol. Also noteworthy is the low rate of frequency of issue categories involving the sexual, loyalty, foreign connections, foreign preference, or security categories.

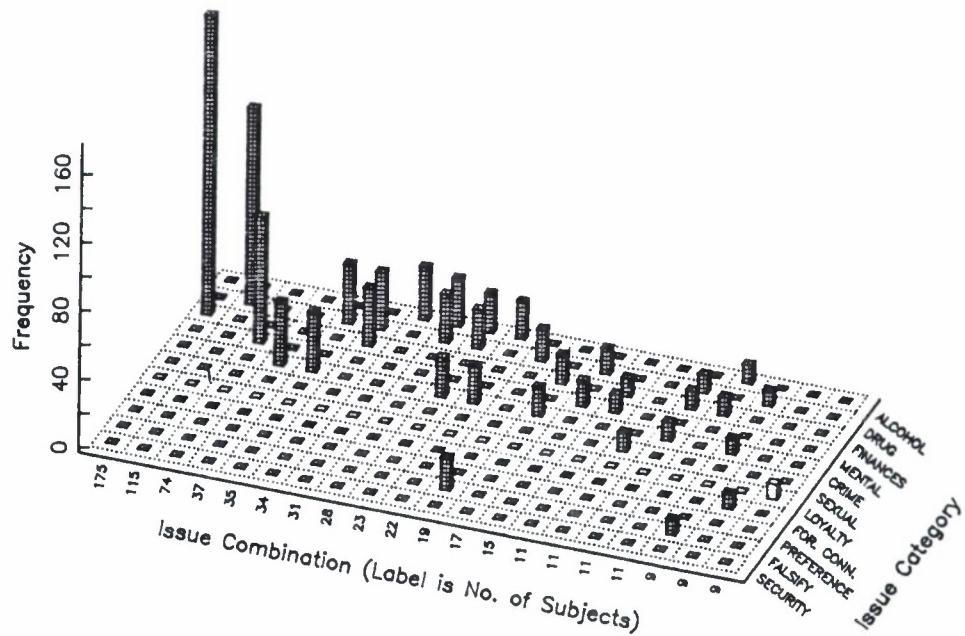


Figure 7. Skyscraper Plot of the 20 Most Frequent Issue Combinations in the BI Sample. Each increment along the x-axis represents the unique issue combination. The issues involved in that particular combination are represented by the particular skyscraper.

Figure 8 displays the 20 next most frequent issue combinations in the BI sample. Only 10% of the subjects are represented among these combinations. Crime and falsification interact strongly with each other and with the other issues.

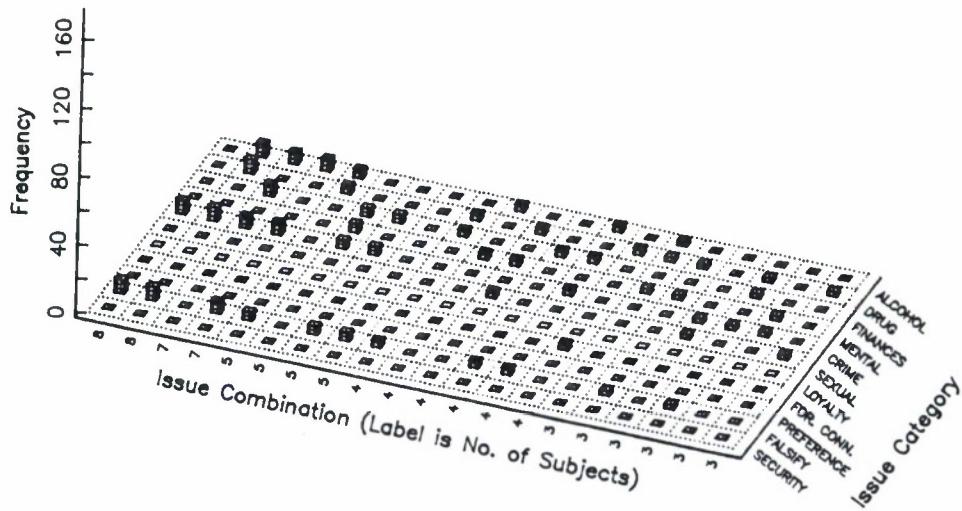


Figure 8. Skyscraper Plot of the 21st through 40th Most Frequent Issue Combinations in the BI Sample.

SBI Issue Combinations

Figures 9 and 10 display the issue combination information for the SBI samples arranged in the same order as the BI. The SBI sample, with relatively few exceptions, does not seriously deviate from the BI sample. The same top 20 issue combinations represent 77% of the SBI sample and the next 20 combinations represent 11%. The pictures strongly suggest, even with such a complex interaction of factors, that the two samples have behaved in remarkably similar ways.

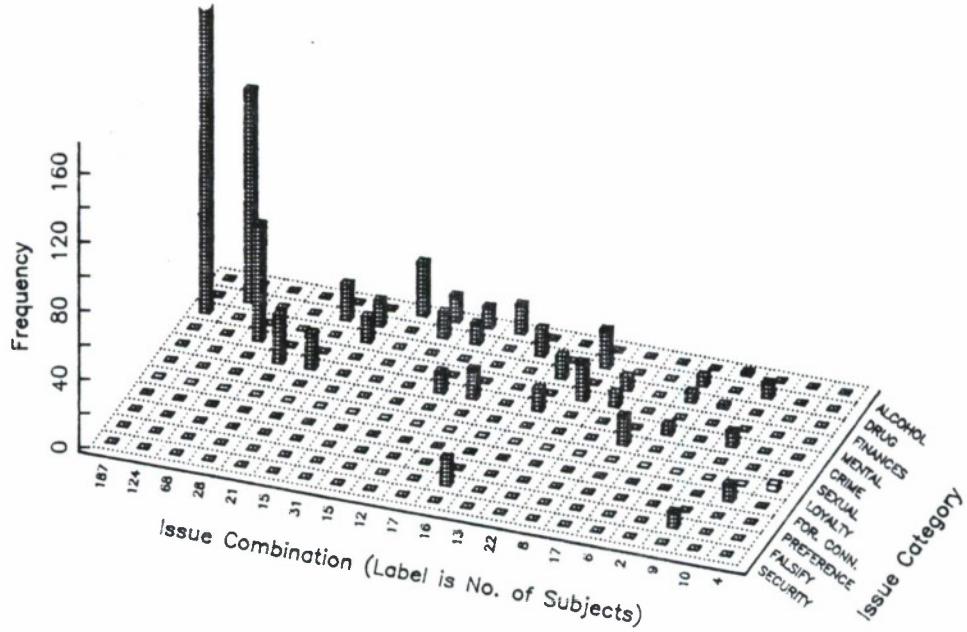


Figure 9. Skyscraper Plot of 20 Issues-Combinations in the SBI Sample Indexed in the Same Order as the First Twenty BI Samples for Comparison Purposes.

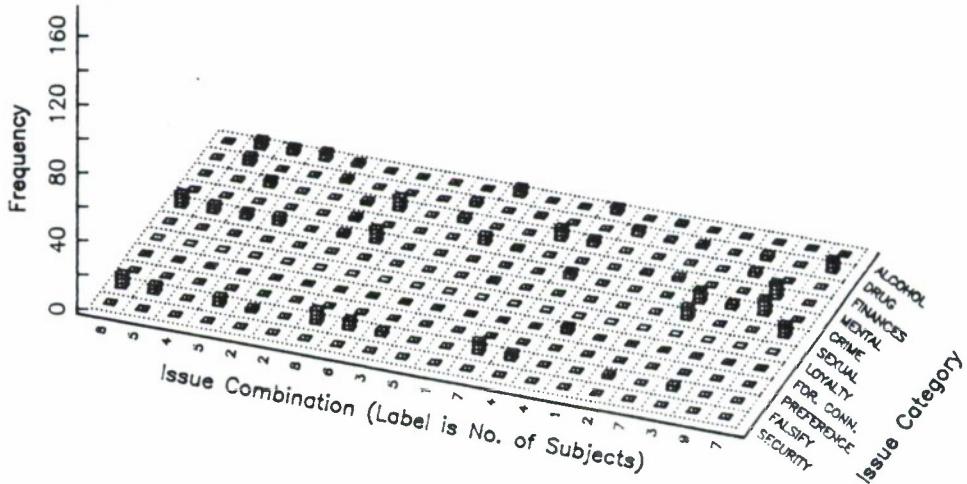


Figure 10. Skyscraper Plot of Next Most Frequent Issues in the SBI Sample Indexed in the Same Order as the Second Twenty Frequent Issue Combinations in the BI Sample.

Single-issue frequency patterns

Figures 11 and 12 show the frequency comparisons of the individuals with only single issues. Comparison of the two samples indicates that single issues occur with similar frequencies in both samples.

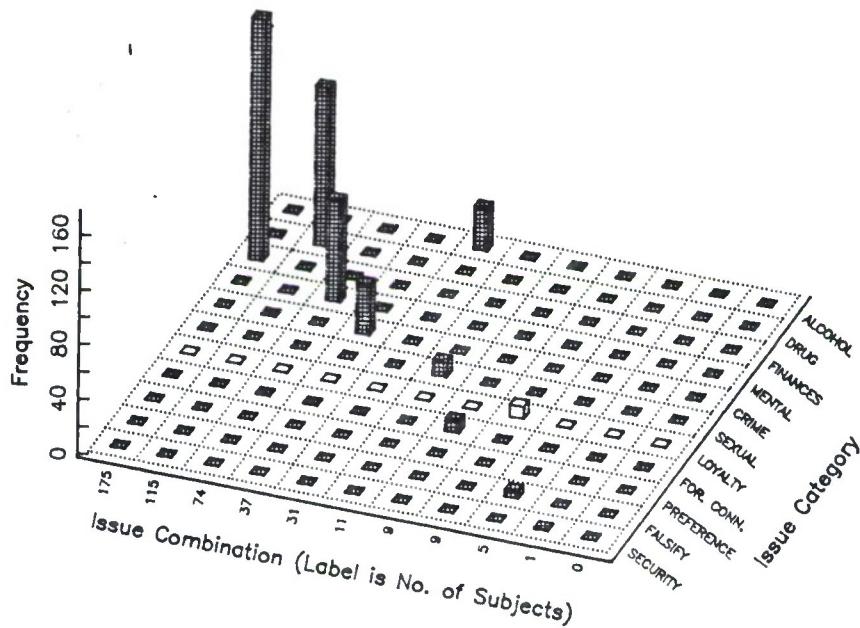


Figure 11. Skyscraper Plot of the Single Issue Cases in the BI Sample.

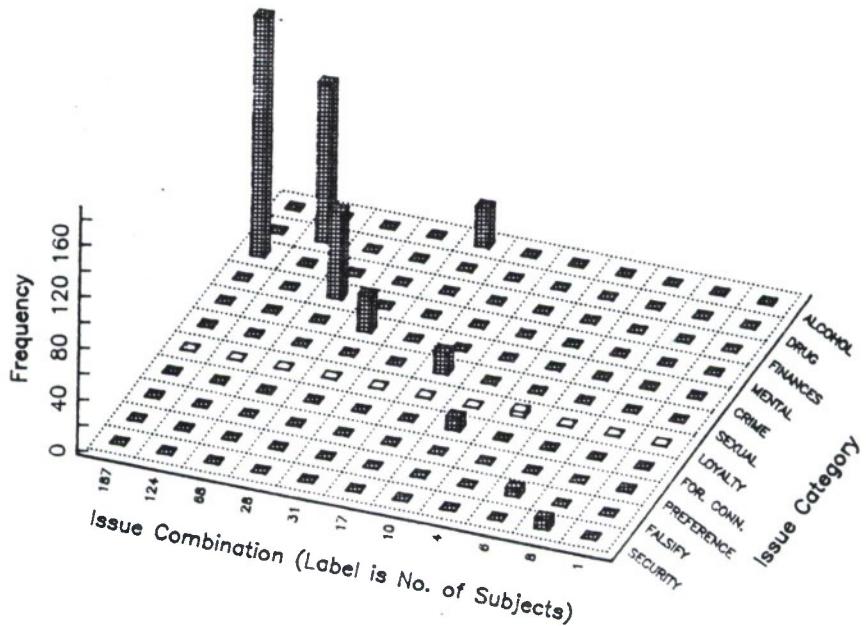


Figure 12. Skyscraper Plot of the Single Issue Cases in the SBI Sample

Double-issue Frequency Patterns

Figures 13 and 14 display frequency comparisons of the individuals with double-issue combinations. It is apparent that the BI sample produces double-issue combinations more frequently than the SBI, but the first seven most frequent double-issue cases are the same for both samples. Drug, alcohol and crime issues are involved in double-issue combinations in a similar fashion for both samples.

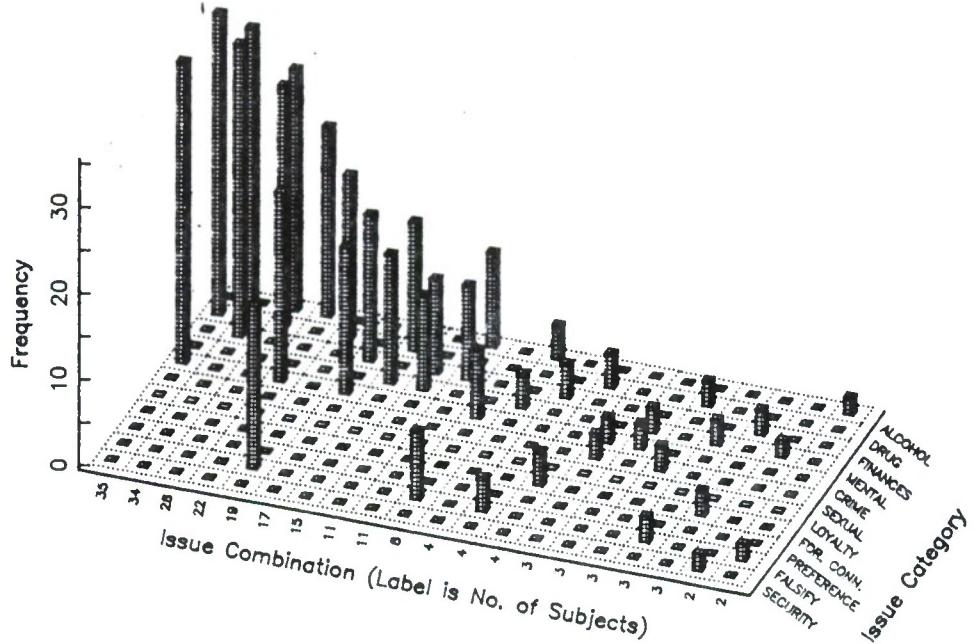


Figure 13. Skyscraper Plot of the Double-Issue Cases in the BI Sample.

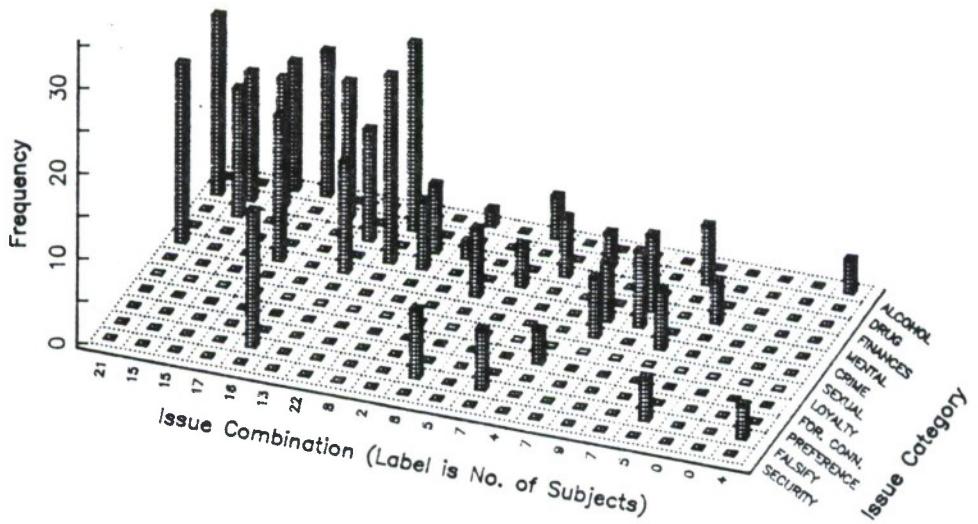


Figure 14. Skyscraper Plot of the Double-Issue Cases in the SBI Sample.

Triple-issue frequency patterns

Figures 15 and 16 represent frequency comparisons of the subjects with triple-issue combinations. Triple combinations, in general, do not occur very frequently. Alcohol, drug, crime and falsification are especially involved in triple-issue cases.

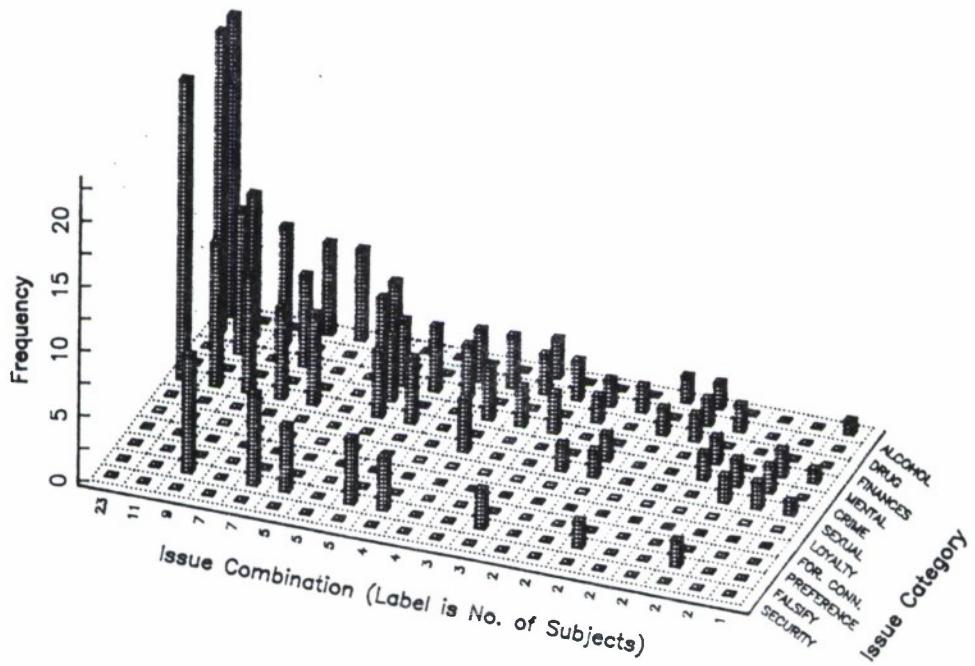


Figure 15. Skyscraper Plot of the Triple Issue Cases in the BI Sample.

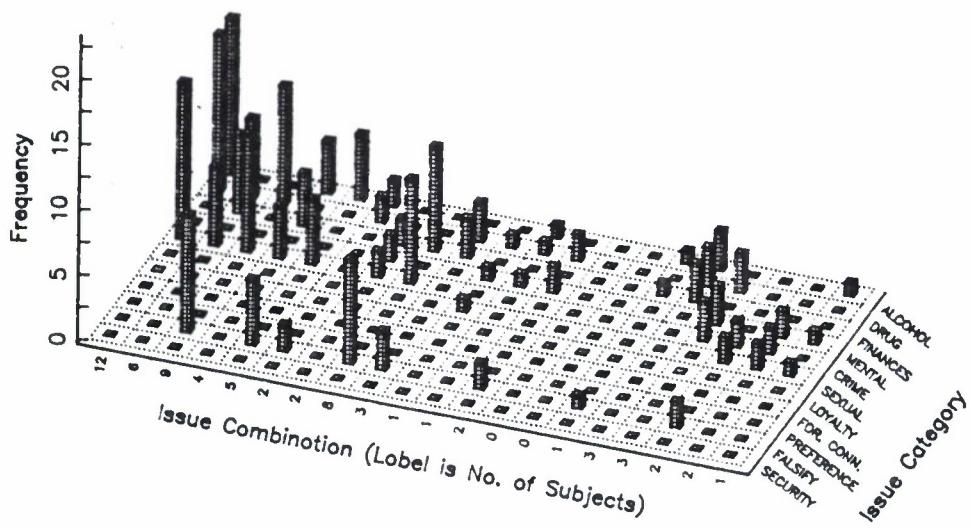


Figure 16. Skyscraper Plot of the Triple Issue Cases in the SBI Sample.

Quadruple-issue frequency patterns

Figures 17 and 18 represent quadruple-issue combinations. In some ways quadruple-issue cases are the most serious cases, even though they occur infrequently. It is probably inappropriate to draw many conclusions from these patterns; however, the interaction of alcohol, drugs, crime, and falsification are very strong.

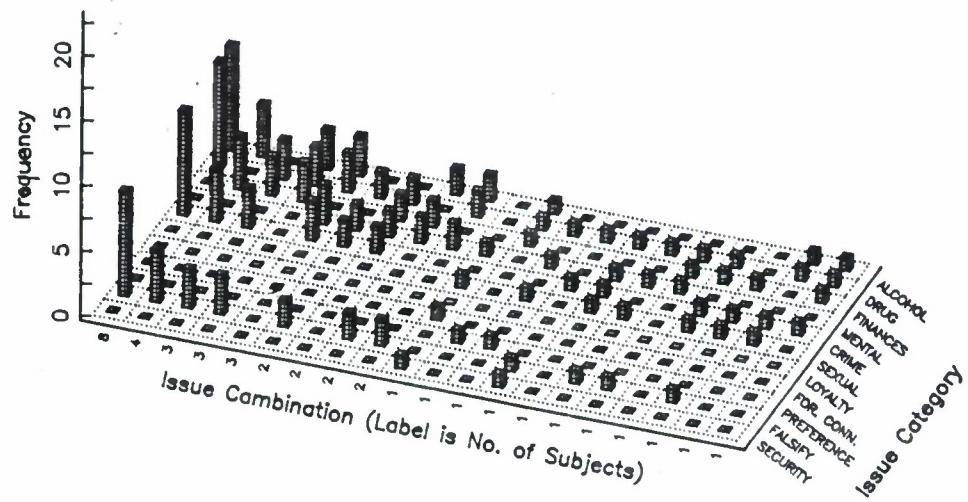


Figure 17. Skyscraper Plot of the Quadruple Issue Cases in the BI Sample.

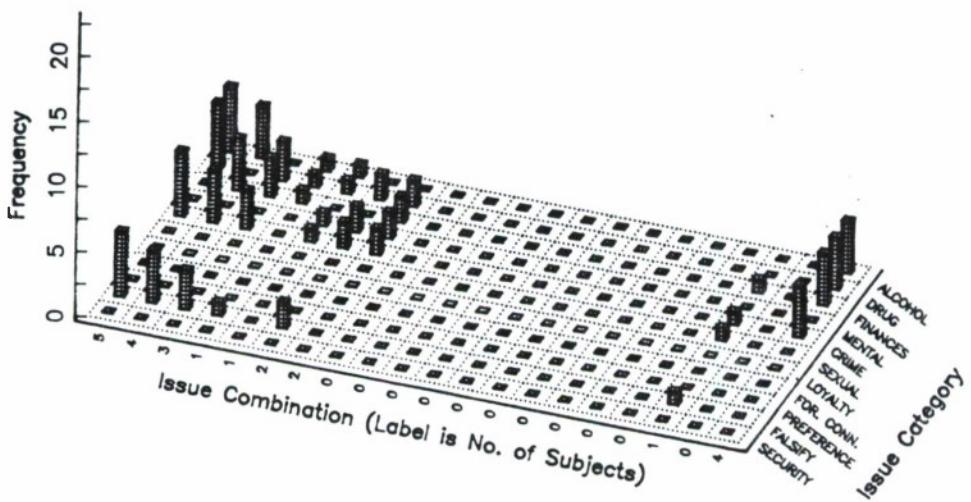


Figure 18. Skyscraper Plot of the Quadruple Issue Cases in the SBI Sample.

As a final note, it is important that issues not be completely discounted because of their relative rarity. There is no way to determine, based upon these samples, who was awarded a clearance and who was deemed ineligible. Some of the rare combinations may, in fact, be the ones which are most interesting. Examination of the issue cases which resulted in denial of clearance may highlight these rare combinations.

Summary and Conclusions

Demographic Information

The gender configuration of the SBI population is statistically different from the gender configuration of the BI issue populations. The SBI population has a significantly greater proportion of women than the BI population.

The age distribution of the SBI and BI issue-case populations appears to be the same.

Employment status distributions of the SBI and BI issue-case populations appear to be significantly different. The proportion of DoD civilians in the SBI sample is significantly larger than the proportion of DoD civilians in the BI sample.

Issue Analysis

The SBI sample, in general, had a slightly smaller percentage of issues in most categories and a smaller mean number of issues for each subject (1.63 issues per subject for the SBI sample versus 1.73 issues per subject for the BI sample). It is difficult to say whether this difference is meaningful, because many subjects had multiple issues and there was no difference in the proportion of issues per individual in the BI and SBI populations. The presence of multiple issues presents a problem that is not amenable to traditional, contingency table analysis. It is not statistically possible to compare the distribution of issues in the SBI and BI populations; however, the graphs of issue counts by sample strongly suggest that the issues occur in similar proportions in both populations. When depicted graphically, both samples show similar patterns and frequencies of issue combinations.

Conclusion

It appears that the type and amount of information contained in BI and SBI is roughly the same. Although there are some differences between the samples, graphical and statistical analysis of the samples does not reveal any major differences. In fact, the similarities between the amount and type of issue cases in both samples is noteworthy. This suggests that population differences are not strong enough to affect issue patterns and that the two investigations are equivalent in developing issues. Thus, we conclude, based on the data available, that there is little difference between the BI and SBI in terms of type and amount of information obtained.

There are unanswered questions about representatives of the BI and SBI samples and the quality of material generated by the BI and SBI. These questions require separate inquiry and will be addressed in future studies.

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